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that known by the name of the fuming liquor of Libavius. Weak muriatic acid first came over; and then the muriate either passed into the receiver, or sublimed into the neck of the retort in a white mass, known formerly under the name of the butter of tin. With the same view he passed muriatic gas as dry as possible through the concentrated mother water, of muriate of tin, when it became fuming, and yielded crystals on mixing with it pure water. But it must be observed that the fuming liquor of Libavius emits much more dense and copious vapours, that it is whiter, and that its specific gravity is greater

The combinations of muriatic acid and tin in the state of solution, of crystals, or of mother water, have always an excess of acid; and from what has been said it appears, that they are all capable of infinite variations in their state. Hence we need not be surprized if the effect they produce in dying are so uncertain and so different from one another. The least variable state of muriate of tin appears to be that of crystals perfectly white and thoroughly drained. In this state this mordant ought always to be employed in dyeing, adding to it a larger or smaller proportion of nitric acid, according to the shade we wish to produce. Such a composition alone can be uniform, and yield constant results.

Profiting by the facts detailed in this paper, it appears easy to give a simple and advantageous process for preparing the crystallized muriate of tin in the large way, yet the author has met with very perplexing difficulties in the attempt to carry it into execution. These however he has at length been able to surmount, and the description of the method he pursued will form the subject of another paper.

Improved mode of preparing Phosphorus Bottles.

Phil. Jourl. Vol. 26. p 105.

Phosphorus cut into small pieces, and mixed with quick lime in powder, answers the purpose very well. The phosphorus should be carefully dried by filtering paper; a thin slice being cut may be divided into as many pieces as can be expeditiously done, and each piece be introduced into a small bottle with as much lime, as will surround it Lime slacked in the air, and submitted to a strong heat in a black lead crucible for twenty minutes, is in a good state for the purpose.

The bottle, when full, may be exposed, corked, to the radiant heat of the fire, till some pieces of the phosphorus have assumed an orange tint: it will then be ready for immediate use. But the heating is not absolutely necessary, if the bottle is not wanted for immediate use, and it will continue longer in a serviceable state.

It is almost superfluous to observe that in using the bottle, the mouth should be closed with the finger as soon as the match is withdrawn.

The author of this paper has been in the habit of preparing a bottle by this method, at the conclusion of winter, for the purpose of lighting a lamp furnace during the summer months, when access to fire was not convenient. A narrow quarter ounce bottle has generally continued serviceable four or five months, though very frequently used.

Account of an Island containing 216 acres gained from the sea, by John Harriot, esq.

Mr. Harriot in his excursions in a boat which he kept for his amusement in the navigable river near which he lived, had frequently noticed a sunken island, containing between two and three hundred acres of land, dry at low water and covered at half tide This island being put up to auction with other property of its owner after his decease, Mr. Harriot purchased it for £40, some others having bid for it contrary to the general expectation; this purchase was made in the month of May, and from that period he began to make preparations for embanking it from the sea.

He sent to the fens of Lincolnshire, and other places, for men suited for the work; and had a building framed for their accommodation, and erected on the island high enough to prevent the tide from flowing into it, kept a boat to attend it and employed a man to keep a kind of suttling booth in it to supply them with good London porter. The building also afforded them shelter in bad weather, and was so constructed as to serve for a stable when the work was completed.

In July 1781, a beginning was made, and in December following a wall or embankment of earth was raised thirty feet thick at its base, battering away at an angle of 45 degrees towards the sea; eight feet high and six feet thick at the top. The foundation on which the wall was fixed was more than two feet above the level of the rest of the island; it was more than two miles and a half in circumference, and was carried over several deep rills or outlets. The work had hitherto gone on with rapidity and safety. The two ends of the wall were only 140 feet apart; but here the difficulty commenced, for this space was occupied by a ravine through which the tide ebbed and flowed, with a current and fall similar to that which passes through the great arch of London bridge, but stronger. Mr. Harriot had contracted with two men for the execution of the work, and at this critical time strove to prevail on the contractors to use some strong timber in closing the interval, which he offered to furnish to them exclusive of his agreement: but they obstinately refused, persisting in asserting that they could do better without it.

The effect of this obstinacy was what might be expected; the greatest exertions were made by the men, to fill up the interval, insomuch that by the actual measurement of some of their work, no horse could have carted away as much loam as one man dug and another wheeled away at that time; but it was all in vain, for want of the timber recommended to strengthen and support it, the weight of the earth above as fast as it was laid on at top pressed out that at the foot, so that on the sixth tide, after shutting out the sea, all this great body of earth was swept away, with scarcely a vestage of it to be seen; and the difficulty was encreased ten fold, on account of the greater distance from which it was now necessary to fetch earth to fill up the breach.

The contractors applied for more money, but having already got more than what was stipulated, Mr. Harriot very properly refused them; on which they ran away £125 in debt to the labourers.

The sea wallers are remarkably desparate and uncontroulable, which added much to the embarrassment of Mr. Harriot's situation; nevertheless by steady resolution he prevented all attempts at riot, and got them to depute three of their number to treat for completing the work; with whom he agreed to pay them the same prices as the contractors had done; and to farther stimulate them to exertion he promised voluntarily besides to make good their loss by the contractors on their succeeding finally in effectually shutting out the tide. The season which was January was much against the work, and the timber necessary was to be felled thirteen miles distance; Mr. Harriot however had several trees cut from ten to fifteen inches in diameter, with which having made piles from twelve to twenty-four feet in length, he drove them with an engine, in two rows, fifteeen feet apart across the outlet, as close together in the rows as they could be driven. These piles were farther secured by girders, or beams, bolted and keyed across them, within five feet of the bottom and three of the top. This formed a coffer dam to hold the earth in the center of the mound, as a strong support to the whole.

On the seventeenth of January, this coffer dam was filled up with earth, and the sea completely shut out, but as the tide was rising every day it was necessary to keep the men at full work for some time in raising and strengthening the bank and also to keep some of them in readiness each night to watch the effects of the tide. By these means Mr. Harriot enclosed the island from the sea, and so far proved the practicability of the undertaking. His description of closing the work (in his publication called his *struggles through life*) is very animated, and well worth the perusal, particularly of those who have similar undertakings to execute; he concludes this part of the account by the following remarks on the management of the land after enclosing it which deserve peculiar attention.

"Too eager to reap the fruits of my enterprize I rushed into an unprofitable expense of ploughing the greatest part of the land before it was fit. I thought to have sweetened it the sooner by working it and exposing it to the various elements, but I was deceived. If I had left it to its own operations of drying, cracking, and getting rid of the superabundant salts, by a gradual draining from the rain, &c. and been content with a small produce from feeding of sheep for a few years, I should have done much better."

Mr. Harriot soon after a heavy loss by the burning of his dwelling, had the misfortune to be deprived of his island again by the sea, of which he gives the following account in a letter to Mr. Moore, then secretary to the society of Arts, dated February, 1791.

"It was no longer ago than the 17th of March last that I had the misfortune to have my house, barn, and out houses, all burnt down, with difficulty saving our lives. My loss from this above my insurance was great to a man who could never boast of affluence, yet I looked forward with a pleasing confidence. My island so lately embanked from the sea was beginning to repay me bounteously: it cleared me 300 the last year, with a promising appearance of great income for years to come, I had rebuilt my house and got my family together again.

"In this situation of my affairs, the second of this mouth produced a tide on our coast, higher by a *foot* than was remembered by the oldest man living My island fell a victim to its ravages; above one fourth of the wall, or bank, had settled nearly *a foot* more than the rest; this was *intended* to have been raised eighteen inches last summer, if my loss by fire had not obliged me to defer it. This delay occasioned the loss of my island; the tide flowing seven or eight inches deep over one hundred and fifty rods in length of the bank, flooded the whole island. At the fall of the tide I found my island left full of water, too fatal a proof of the strength of my banks, though it satisfied me there was no breach.

"By extraordinary exertions (the more so from the harrassed situation of my mind at the time) I drained the water four feet below the surface of the land in a few days. I then had the walls surveyed, and an estimate made of what it would require to repair them, and secure the island from a similar accident. This amounted to £500 at least. I had it not, and could not think of borrowing without a greater certainty of payment than I could pretend to."

Mr. Harriot at this juncture thought it most honourable to lay the state of his affairs before his creditors, who were so well satisfied with his conduct, and felt so much for his misfortunes that they cheerfully relinquished half their claims, and contributed handsomely besides to a subscription, which was set forward for his relief, by which £1017 was soon collected, when he thought it best to put a stop to it by publishing a letter on the subject, as his design was only to recover his losses, not to make an emolument by the generosity of the public. This sum enabled him "to recover and secure the island, against such outrageous tides in future;" besides settling immediately with all his creditors.

The growing crops that looked so promising before the inundation were totally destroyed. Mr Harriot ploughed some of the land, as soon as it was in condition to bear the horse, and sowed a few oats, and a little mustard seed, to try the vegetative powers of the land, and ascertain the effect which the salt water had produced. But the ground was so much saturated with the salts, as to require the same time, labour and expense as at first, to bring it round to the state of vegetation in which it was before the inundation.

He repaired, and heightened the sea wall all round the island, and ploughed up and fallowed as much land as he could. Those seeds which he sowed at first came to nothing, and the crops of the succeeding year confirmed his apprehension that he should have nearly the same tediousness and expense to go through, as he had before experienced, if he should farm it himself: for this and other reasons he sold his interest in the island, along with the rest of his fixed property, and removed to America; the account of which removal, and of his return is very interesting and instructive.

Mr. Harriot states in concluding the account of the island, that in the year 1807 it had recovered from the effects of the inundation; and in the hands of the present occupier produces as good wheat as any in the country.

The above account has been extracted from Mr Harriot's *struggles through life*, a few more particulars relative to the island may be found in the fourth volume of the transactions of the Society of Arts, who voted him their gold medal for enclosing this island from the sea; it is there mentioned that the island is situated between great Wakering in Essex, and Foulness island, and is called Rushley; and that the piled part of the bank, which closed the work, extended at the foot one hundred feet towards the sea, and fifty towards the land; and was seven feet wide at top, and was somewhat higher than the rest of the bank. It is also mentioned that the gutter, or trough, which carried off the water, that drained from the land, through the bank, was made of elm, and was fifty feet long, eighteen inches wide, and twelve inches deep, with proper lids at each end, to let the water in or out at pleasure; it was placed three feet and a half below the surface of the earth. Mr. Harriot observes that a great mistake occurs in the formation of most gutters, or troughs, for this purpose; in general they are made square, or nearly so, yet there is no comparison in the discharge of water from a flat gutter, of the same number of square inches with a square gutter.

Observations....The great quantity of land, favourably situated, for embankment from the sea, which lies in the vicinity of Belfast, has led to the supposition that the foregoing extracts would be both useful and interesting to many of our readers. It is extraordinary how much property has been lost in attempts of this nature, from a false economy; the saving of a foot of embankment at the top, where its little width would render the expense trifling, has often been the cause of the loss of thousands of pounds in other cases, as well as this. The misfortunes Mr. Harriot met with, very well excused this omission on his part, but in many cases that could be mentioned, neither time nor property were wanting, and yet the same fatal error was made. Might it not for this reason be a proper precaution? when the great bank in such works was raised as high as the highest spring tides were known to reach, to construct another smaller bank above it three or four feet high, like the back of a common ditch (in the same manner as the parapet is raised above the rampart in fortification) in order to *insure* the safety of the whole: this would be no great addition to the expense, and considering the money it would cost, as laid out for the purpose of insurance, probably it would not amount to as much as the fee simple of the sum, which it would be necessary to pay annually for insuring property of equal value in buildings, from fire. This small bank lying above the reach of the salt water, might be entirely covered with vegetating sods, which would perfectly secure it from being washed down by rains, and make a permanent termination to the whole; where stone was plenty it might be faced with this material towards the sea, in the same manner as the excellent fences usual in the county Louth, which are so durable; and this would have the advantage of admitting this small bank to be made narrower below, which in some cases might be desireable, as stone does not require to be sloped as earth does.

Some useful considerations also arise from the above accounts, relative to the agricultural management of land gained from the sea. It appears that Mr. Harriot thought it would have been better if he had not broken up the land after it was drained; in this case there can be no doubt but that a small part near the surface would become productive sooner, as the salt would be speedily washed from it sufficiently to admit of the vegetation of the grasses with short roots; but then the salt would be retained longer below, and the period when deep rooted vegetables might be raised in it to advantage would be proportionally remote; might it not be advantageous to select those vegetables for the first crops, which are known to thrive in a salt soil? several of this nature, from which soda is procured, are cultivated to advantage in foreign countries, and would also succeed well here; some plants also which afford abundance of potash flourish in the vicinity of the sea. Rape likewise has been known to succeed on lands of this nature. It is probable also that certain substances laid on the land would accelerate the decomposition of the salt; of those, lime is the most obvious, as well as the most easy to procure. But, where plenty of fresh water can be had, which is the case in most situations near the sea in Ireland, it seems most consonant to reason, that frequently flooding the salt ground with fresh water from the neighbouring brooks, and again draining it off, would free the land from the salt with more expedition than most other methods, and therefore that at least it deserves to be tried in a free and impartial manner.

As the embankment of land from the sea is evidently a subject of great importance, it is intended to select papers conveying farther information respecting it, for the future numbers of this miscellany.

Mr. Harriot is now magistrate of the Thames police, an establishment planned by himself, where he still continues those useful exertions for the public benefit, which have so frequently graced his eventful life.

Farther account of the Action of De Luc's Electric Column.

The small bells, moved by De Luc's electrical column, which have been noticed in our last number, still continued to ring on the 25th of June, as they had done since the 25th of March. Those who wish to have electrical columns of this kind, fitted up in the form of rods, as described in our number for April last, may now obtain them from Mr. Blount, optician, Cornhill, London.

An account of the Method of manufacturing Salt at Moutiers, in the Department of Mont-Blanc. By M. Berthier, Mine Engineer.

Journal Des Mines.

The springs which supply these salt-works are about a chiliometre (rather more than half a mile) from the town of Moutiers, in the centre of Salins, a small village near the junction of the two rivers Doron, in a valley of the same name. The springs issue from a limestone rock, at the foot of a precipice fifty metres (yards) high, adjoining to which is a formation of gypsum. They probably rose formerly to the surface of the ground, but at present those which are worked are seven metres below it. The present works are of some standing, and were probably erected in 1730; but their books were lost at the time of the invasion of the Spaniards in 1743. The antient Earls of Salins had also extracted salt from another spring in this neighbourhood, the water being brought up by an endless chain of buckets, running over a wheel, in which women walked. It was concentrated by being poured repeatedly upon bundles of straw, and then evaporated in boilers. This spring was destroyed in the war of 1690.

The temperature of the water of these springs is from 25° to 30° Ream. or 88° to 99° Fahr. It emits many bubbles, and shows from 1° 50 to 1° 83 by Baume's hydrometer, which is used in all the French salt-works, and of which the degrees are equal to one fifteenth of the stem between the level to which it sinks in distilled water, and which is taken for the point whence the degrees are reckoned, and that to which it sinks in a solution of fifteen parts of muriate of soda in eighty five of water at 10° Ream. or 55° Fahr.

100lbs. of the spring called the little spring, contains only 1.058 of muriate of soda, 0.251 of sulphate of lime, 0.1 of sulphate of soda, 0.076 of carbonate of lime, 0.075 of uncombined carbonic acid gas, 0.055 of sulphate of magnesia, 0.0305 of muriate of magnesia, 0.012 of carbonate of iron, and 0.01 of muriate of iron.